

GEARTECH	QUALITY PROCEDURE	No. QP8701	SHEET 1 OF 3	
		Rev. A		
Inspection of Gear Tooth Contact Patterns with Soft Compound		BY RLE	DATE	8/13/02
		CKD JRM	DATE	8/13/02
1.	Scope			
1.1	This procedure covers inspection of gear tooth contact patterns using soft marking compound under no-load or low load, with the gearset on a roll stand or in a gear housing.			
2.	Referenced Documents			
2.1	AGMA 915-1-A02 Inspection Practices- Part 1: Cylindrical Gears- Tangential Measurements.			
2.2	GEARTECH Specifications:			
	CK8700	QP8700 Gear Tooth Contact Patterns.		
		QP8701 Inspection of Gear Tooth Contact Patterns with Soft Compound.		
		QP8702 Inspection of Gear Tooth Contact Patterns with Hard Lacquer.		
		QP8703 Inspection of Gear Tooth Contact Patterns in a Roll Stand.		
		QP8704 Inspection of Gear Tooth Contact Patterns in a Gear Housing.		
3.	Terminology			
3.1	Contact pattern- The gear tooth area covered by marking compound transferred from the pinion.			
3.2	Roll stand- A test fixture in accordance with QP8703.			
3.3	Gear housing- A gear housing in accordance with QP8704.			
3.4	Tape lift-off- A permanent record obtained by lifting a contact pattern from the gear using lift-off tape in accordance with 5.5 and 9.1.			
3.5	Worst pattern- The contact pattern nearest to a boundary of a gear tooth at the tip, root, or end. The worst pattern does not necessarily cover the least area.			
3.6	Reference end- One end of the gear shall be designated the reference end. It can be identified by a unique feature such as long shaft extension, short shaft extension, or an etched unique mark.			
4.	Significance and Use- See QP8700.			
5.	Apparatus			
5.1	Gear tooth marking compound- Contact pattern tests shall be performed using PT-650 Tooth Marking Grease available from Products/Techniques, Inc., Rialto, CA, tel: (909) 877-3951.			
5.2	Application brush- Gear tooth marking compound shall be applied with a soft, fine-bristle brush.			
5.3	Brush container- The application brush shall be stored in a clean, covered container whenever the brush is not in use.			

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5.4	Brush palette- A small amount of compound shall be stored in a clean, covered container. The container shall be large enough to allow working the compound into the brush by using the inside bottom of the container as a palette.			
5.5	Lift-off tape- Contact patterns shall be recorded with Scotch No. 845 (2 inch wide) Book Tape available from 3M Stationery & Office Supplies Division, St. Paul, MN, tel: (800) 364-3577.			
6.	Test Specimens			
6.1	Gearset- Contact pattern tests shall be performed on a gearset mounted on a roll stand or installed in a gear housing, in accordance with either QP8703 or QP8704.			
7.	Procedure			
7.1	Test procedure- The test procedure shall conform to AGMA 915-1-A02, Clause 10, except as specified by this quality procedure.			
7.2	Applying marking compound to brush- Loading and reloading of the brush with marking compound shall be done with a brush palette in accordance with 5.4.			
7.3	Calibration of marking compound thickness - Operator training and application technique shall be verified to maintain accuracy and repeatability of coating thickness within 0.008 mm to 0.012 mm. Calibration may be performed with master gears or with a precision straight edge and surface plate. Viscosity of the marking compound shall be carefully controlled to ensure uniform and repeatable coating thickness. It is preferable to return the compound to the manufacturer for changing its viscosity. Otherwise, viscosity may be reduced by mixing the compound with methyl ethyl ketone (MEK). CAUTION: MEK is toxic and hazardous. Follow precautions given by the Material Safety Data Sheet (MSDS).			
7.4	Cleaning- Pinion and gear teeth shall be cleaned with a clean lint-free cloth soaked in fast drying solvent.			
7.5	Applying marking compound to pinion teeth- The load flanks of all pinion teeth shall be painted with marking compound using the application brush and brush palette. Application technique shall be carefully controlled to be the same technique used during calibration in accordance with 7.3. No coating such as Prussian blue, marking compound, dye check developer, or DYKEM (see QP8702) shall be applied to the gear.			
7.6	Rolling gearset- The pinion shall be turned by hand with a light load applied to the gear shaft by hand or a brake. For unidirectional gearsets, rotational direction shall be chosen to load the drive flanks of the gearset. The pinion shall be turned until the gear has rotated one complete rotation. For bi-directional gearsets, the procedure shall be repeated in the opposite direction.			
8.	Tooth identification- The pattern of marking compound transferred to the gear shall be visually inspected to find the tooth with the worst pattern in accordance with 3.5. This tooth shall be identified as tooth 1.			

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8.1	Etching identification numbers- Tooth numbers shall be permanently marked on the reference end of four teeth equally spaced around the gear starting with tooth 1. Teeth shall be numbered 1 through 4 clockwise looking from the reference end.			
9.	Recording Results			
9.1	Tape lift-offs- Starting with tooth 1, place a length of tape over the entire tooth. Allow tape to fold over the edges and to land to define the tooth boundaries. Starting at one end, carefully peel the tape from the tooth. Place one end of the tape with adhesive side down, on white paper and carefully spread the tape across the paper. Annotate the tape to identify the tooth number, tip, root, and reference end. Repeat tape lift-offs for remaining teeth numbered 2, 3, and 4.			
10.	Interpretation of Results			
10.1	Tape lift-off- Unless otherwise specified, the tape lift-offs shall be interpreted in accordance with Clause 10.4 of AGMA 915-1-A02.			
11.	Acceptance Criteria			
11.1	Contact pattern- The contact pattern shall be within limits specified on the engineering drawing for the pinion or gear. In lieu of engineering specifications, the worst pattern shall cover 75% of the available tooth contact area. There shall be no contact at extremes of the tooth near the tip, root, or either end.			
12.	Report			
12.1	The report shall include the following:			
12.1.1	Description of the gearset,			
12.1.2	Description of roll stand or gear housing,			
12.1.3	Test load,			
12.1.4	Annotated tape lift-offs,			
12.1.5	Record of verifications, and			
12.1.6	Record of calibrations.			